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THE frightful accident in Cincinnati a few days ago, when Post & Co.'s building fell and crushed the men who were working in it, is of a kind to leave a discouraging impression, because the venturesomeness or recklessness which made it fatal is of a kind that may be expected anywhere and at any time, if it is permitted, while to check it is difficult. The building had taken fire in the night, and the fire had swept through it from top to bottom, but had been put out before it had destroyed the floors or even the roof, although the floor timbers were partially burned, and the roof so riddled that it was necessary to cover it with a tarpaulin. There was a good deal of machinery and heavy stock in the building, particularly on the upper floors, and the owners, after having it inspected by the insurance adjusters and by a builder, put a gang of forty men into it to remove the rubbish. They had contracts to fulfil, and seeing that the building held together they proposed to start their machinery and resume work the next day, meaning, apparently, to carry on repairs while under way. But in the middle of the afternoon part of the roof suddenly gave way and fell upon the fifth floor, breaking it through. Each floor in turn carried down the one below, till a section of the building had fallen through from roof to cellar, killing half a dozen men, and wounding more than twice as many others. There is a "question of veracity" between the owners and the builder who was called in, — the owners saying that before they put their men in they had the assurance of the builder that the structure was safe; the builder declaring that he was called in merely to consult upon repairs, and only incidentally asked whether he thought the walls were safe. An insurance adjuster who examined the building after the fire is recorded as saying that, being familiar with burned buildings, and a cautious man, he "knew that there was no carelessness or recklessness of any kind in having men work in the building." He adds that the floors were not badly burned, although the joists in three of them would have to be replaced, as was the decision of the builder.

THE questions of veracity and of responsibility may be left to those whose business it is to determine them, and if we may judge by the decided action of the coroner next day, in stopping the work of exhumation, which was still going on, they are likely to be brought home. We may safely assume, however, that the builder who went through the half-burned warehouse with the owners, and examined it with the idea of restoring it, understanding that men were to be set at work to clear it out, and who did not suggest any doubt of its safety, expected it to stand. It is plain, then, that neither the insurance adjuster, nor the owners, nor the builder, had any misgiving concerning the safety of the building, of which, it was agreed by all three, the roof and three floors were so burned as to make it necessary to replace them, and in which these floors were loaded with machinery and heavy goods, among which a gang of workmen were to be set tramping about. The truth was, obviously, that none of the three was capable of judging whether the building was safe or not, and none of the three nor all the three ought to have taken the responsibility of deciding that it was safe. This we say not to discredit the persons concerned, but simply because the case was one which called for the judgment of a different person, — the judgment of an engineer, or of some one with an engineer's knowledge. We may not say that an engineer would have condemned the building, but we do say that the only safe person to consult was an engineer, or an architect with the training of an engineer. The question how far partially burned wood can be trusted is a difficult one, and only to be answered by inference and conjecture; but we should have the inference and conjecture of a man who has studied the theory of the behavior of materials under strain. And it is a noteworthy thing that men of theoretical knowledge are more inclined to the safe side than men whose only knowledge is practical. To the ordinary observer it appears that anything which has stood may be expected to stand; but the engineer knows that this does not follow. Structures do stand which are insecure by all the rules of construction, but such structures are always likely to fall. The only reasonable course is to do away with all structures which ought to fall, and to ask the right people whether they ought to fall. The people of Cincinnati begin naturally to call for competent authorized inspectors who shall decide by something better than a happy-go-lucky guess, when there is a question of running such awful risks as in the Post building. When it is commonly realized that it is not safe for an owner, or a builder, or an insurance adjuster, or anybody else unprovided with special knowledge of construction, to determine difficult questions of safety in building, we shall have made one step toward security.

THE predominating interest of the Chicago Custom-House has made us neglectful of the fortunes of its neighbor, the City Hall in the same city, whose troubles, so often commemorated in these columns, are not yet at an end. It is four or five weeks now since the Stone-Cutters' Union of Chicago, whether moved by dissatisfaction at the policy of the contractors toward their workmen or by more patriotic motives, gathered to themselves a number of other persons who were displeased at the progress of the work on this building, and, having called a public or semi-public meeting, appointed what may be called an amateur investigating commission. This commission, after examining the stone-work on the building, pronounced it to be of bad material, badly patched and badly set, whereupon a memorial was addressed to the City Government recommending an official investigation of Messrs. Tomlinson and Reed, the contractors. A special official committee was in consequence appointed by the City Council, and they reported not long ago that much of both the stone-work and the brickwork of the building was bad, and would have to be taken down. They asked permission to call into counsel architects, masons, and stone-cutters, for a thorough examination, and recommended that work and payment should be stopped on the building till the examination was finished. In consequence of this an expert committee of three architects and two builders was added to the committee of the City Government, and their report was to be submitted this week.

THE managers of the Philadelphia International Exhibition do not lack enterprise, and their projects, as set forth in their last official bulletin, will provide a field for all they have. Their original aim was neither narrow nor single, being to furnish an "attractive place of entertainment and instruction to the people of the State and nation;" and having, as they say, succeeded for two years in this, they now propose to expand and classify their collections so that they may offer a systematized exhibition of all the products of human activity, and add to their original provision of "a bazaar for the exhibition and sale of goods, and a place of refined amusement," an efficient engine for popular education. To this end they have reorganized their Council of Education and have distributed under its patronage the whole range of objects for exhibition and instruction among ten departments, each in charge of its own chief and his subordinates. The enumeration of the scope and methods of organization under each department is the principal material of the bulletin. These departments are: the Department of Inorganic Material, including the sections of geology, chemistry, and mining engineering; the Department of Organic Material, covering botany, zoölogy, anatomy, physiology, and palæontology; of Archæology and Ethnology; of National Architecture, Furniture, and Costume; of Model Homes; of Agriculture; of Machinery and Manufactures; of Industrial Training; of Schools, including all educational appliances; and of Fine Arts. The usefulness of the collection in each department is to be furthered by means of instruction or encouragement, — by libraries of books and laboratories, by courses of lectures appropriate to

each department, by loan and sale exhibitions, or competitive trials, and by permanent schools. It will be seen then that the undertaking, originally modelled on the Museum at South Kensington, has in intention far outrun its prototype, and proposes to combine in one tremendous whole the Kensington Museum, the Sydenham Crystal Palace, a technological school, and a permanent fair.

It will be seen that here is an institution which is not to be built up in a day, even assuming that its realization, and the safe administration of it when realized, are possible. But we need hardly say that we think that such different objects as are here aimed at are attempted better separately. When entertainment and instruction are combined in one plan the instruction is pretty sure to go to the wall. South Kensington itself has by no means avoided the reproach that the spirit of the bazaar has infected that of the school; and the Crystal Palace, heralded as a great educational apparatus, has from the beginning been given over to popular diversion, — and to bankruptcy. It is only for subjects of a tender age, and with a very modest scope, that the blending of amusement with instruction has been made to succeed, even with the fullest appliances for object-teaching. One naturally looks with some anxiety, therefore, on an attempt to establish — shall we say it? — a national kindergarten on so grand and costly a scale. When it comes to commingling the commercial element with the other two, the difficulties increase. The commercial element is very ambitious of dominion, and very despotic when once enthroned. It is not clear how much influence the International Exhibition Company intend to allow to the spirit of commerce, but it is clear from what we have quoted that they appeal to it, and when this spirit gets foothold, its associated interests are apt to fare hard. Of the financial and other practical difficulties of their undertaking, its projectors may be assumed to be better judges than we. To establish such collections as they propose except by voluntary contribution of articles intended for sale is of course impracticable; but such contribution is not favorable to control or system, so that to bring the collections to the completeness and order necessary for systematic work is a formidable task. If this were possible the space in the great exhibition building, large as it is, — it is not much larger than the Crystal Palace, — would be altogether insufficient for such a display, and a very great amount of new space would have to be provided. But that is looking a long way ahead. The undertaking must develop slowly, and if it leads to any success, which we may heartily hope it will, it is likely to develop into some other shape and a less comprehensive one than its projectors now intend. We may trust that whatever shape it comes into, it will fairly acknowledge itself and its limitations: that if it turns out a fair, which is a useful thing, it may be made as good a fair as possible, not shaming itself by trying to wear the air of a place of instruction; or if it grows into a genuine museum and school, that it may not be clogged by the accretions, or vitiated by the spirit, of a bazaar.

There is no need to undertake criticism of a system of classification which is merely tentative, and in which experience may be expected to dictate many changes. But the detailed schemes that are offered by the chiefs of some of the departments, which would especially interest an architect, suggest a word of comment. The Department of Architecture, for instance, is to be arranged on the model, not of any architectural museum or place for architectural study, but of the courts at the Crystal Palace. Thus it is proposed to have an Egyptian court, a Greek, a Roman, a Byzantine, a Latin court (whatever this last may be); courts Arabian, Moorish, Indian, Persian, and Chinese; Romanesque, German Gothic, French Gothic, English Gothic, Italian Renaissance, French Renaissance, and Elizabethan. To these would be added a series of structures representing the architecture of modern nations, and extended so as to include the rudimentary architecture of the savage and the nomad, down to the hut, the tent, and the wigwam. We need not expect that such a scheme will ever be fully carried out, but the idea is quite obviously unsuited to anything but a mere public show. There is a certain picturesque attractiveness in the Egyptian, Assyrian, and Alhambra courts at the Crystal Palace, puny as they are, but they are after all only suited to a fair, and when it came to multiplying them so as to include the whole range of architecture, the replication of pygmies would be intolerable.

For any purpose of real instruction a few full-sized fragments, such as the order of the Parthenon set up in the museum of the École des Beaux-Arts, at Paris, or the pediment of the temple of Ægina in the Glyptothek at Munich, with a capital or two from elsewhere, would be worth them all. The character of architecture is best shown, either to the student or to the intelligent observer, by full-sized casts of detail, and in the *ensemble* by drawings, prints, and photographs, or now and then by a well chosen model to small scale, things which admit of compact arrangement and easy consultation. But the proposed series of model buildings, taking in all architecture, ancient and modern, and filled with their appropriate furniture and costumes, would be simply a collection of baby houses, which, if it were consistently carried out, would fill the great exhibition building from end to end. Besides the Department of Architecture we have the Department of Model Homes, which is to include examples of every kind of household apartment with model appliances for its decoration and furnishing, and for all the uses of housekeeping. This implies a sample exhibition of a world of objects which can never really be included in one conspectus, — which are constantly changing and whose variety is endless, — things in fact which surround us all, which we are always studying in the shops, in our own houses, and those of our neighbors, to better advantage than we ever could at an exhibition. In truth we seem to trace the kindergarten idea pervading the details of this grand scheme, in curious contrast to the greatness of its avowed intention. This might make the exhibition effective as one of the sights of Philadelphia, intended for the amusement of children of a larger growth, but it really would not need such complexity of organization or such complete and far-reaching elaboration of detail.

Americans need not feel any special gratitude to foreign savants, or even to native ones, who find scope for their ingenuity in suggesting to us cheap uses to which we may put Niagara Falls. We mentioned at the time they were first broached (*American Architect*, May 5, 1877) Dr. Siemens's computation of the water-power of our great cataract and his suggestions for its utilization. It was a relief when we found that Mr. Edison, who had been invited to try his hand at grinding electricity out of the fall, had concluded that the experiment would cost more than it would come to. But the question is one of those that are not allowed to sleep long, and a paragraph has lately been going the rounds of the papers which smacks suspiciously of Dr. Siemens's figures, computing again that the annual water-power which "runs to waste" in the great fall is seventeen million horse-power, or the equivalent of the earth's annual production of coal. And lately Sir William Thompson, in giving evidence before a Select Committee concerning the serviceability of the electric light, took occasion to prophesy that the Falls of Niagara would in due time be used to supply light and mechanical power over a large area of the United States. Let us hope, nevertheless, that the people of the United States will grow in appreciation of the few natural features of unrivalled magnificence which nature has given them as fast as they grow in mechanical skill, and will prefer to listen to a countryman of Sir William Thompson, the late Governor-General of the English Provinces, Lord Dufferin, who proposed that our Government should join with his to set apart Niagara and the region about it as an international park, secured forever from injury and degradation. It is perhaps not unnatural that Europeans should forget that we are likely to have other water-power which could for generations spare us the occasion for reverting to the most magnificent of all; but there seems to be a fatal itching among great projectors to pit themselves against the mighty works of nature, somewhat as the tourist thinks that mountains were made for him to climb, or as the small boy burns to kick at an elephant. There are a thousand unused water-falls distributed over the land ready to apply their power when it may be needed: there is but one Niagara, and the world would not easily forgive us for marring it. Possibly some future Sir William Thompson will discover that this one is useful to the economies of nature in its present working, as it has been found that there is a use for the forests that cover leagues of land to us unproductive, or for the mountains which the thrifty farmer would fain cast into the sea. In the mean time no man — be he inventive man of science, or scheming man of business — is justified in telling us that Niagara runs to waste because it has not been set to turn his mill.

THE OPEN FIRE-PLACE. XIII.

THE above Tables III. and IV., although records of single experiments, are representatives of a large number made to verify each other. The tests were made with such care that the results were closely similar where the amounts of fuel burned were the same, and its hygrometric condition the same, *i. e.*, containing about ten per cent of water.

Where larger quantities of fuel were burned, the saving of heat would vary in proportion, on account of the varying absorption of heat in the walls of the heaters and in the brickwork. There should also be a slight variation, for the same reason, between the calorific power of the heaters themselves, corresponding to variations in the amounts of fuel consumed, because of the different methods of setting, and of the presence or absence of a fire-back inside the iron case of the stove.

In order to ascertain these differences, as well as to test more fully the accuracy of the results previously obtained, careful experiments were made on two successive evenings, on the Dimmick Heater, and on the Fire on the Hearth Heater. These two heaters may be taken as types of the various kinds of ventilating fire-places heretofore described, and their calorific power once accurately obtained, we have a gauge for the rest.

These may be divided into two classes, the first having hot-air circulation tubes, and the second having a radiating drum above the fire and a smooth or ribbed shell for its fire-box. The Dimmick Heater represents the first, and the Fire on the Hearth Heater the second class. The experiments were made under similar conditions with those previously made, but burning in each case eight kilograms of wood, instead of three. Most of the experiments herein described having been made after office hours, the liability to interruption was avoided and greater accuracy assured.

Great care was taken to protect the thermometers by plates of glazed tile from the direct radiation of surrounding objects likely to affect them. The experiment recorded in Table V. was made on the Fire on the Hearth Heater; that in Table VI. on the Dimmick Heater. In the former the size of the left-hand register was slightly enlarged beyond what it had been in the previous experiments, measuring in this 150 square centimeters in area and in the previous only 140 square centimeters. Both heaters were set in the most careful manner, so as to insure the best contact of the fresh air against their heating surfaces, and the observations were taken nearly every minute, although only one in every five minutes is recorded in the accompanying tables, on account of want of space. The calculations were made on the figures for each minute, and the sums of the results obtained for intermediate minutes not here recorded are placed in the tables opposite those given.

By Table V. we find the heat saved by the Fire on the Hearth Heater in burning eight kilograms of wood was sufficient to raise the temperature of 6797 cubic meters of air 1° C. This is equivalent to 2121 heat units. Assuming that our eight kilograms of wood, containing about ten per cent of water, yielded $8 \times 3590 = 28{,}720$ units, the amount saved was again seven per cent, as in the previous experiments of which Table III. records one. Add six per cent for radiation, and we have again thirteen per cent utilized where wood is burned, and $7 + 13$, or twenty per cent, where coal is the fuel, and with the upright double flue attachment twenty-five per cent or thirty per cent as before. We see by this table, columns 1 and 10, that, while it took but a little over an hour to burn up the eight kilograms of wood, the heat remained in the fire-back and brickwork for over two hours and a half after the wood was burnt out, and that, indeed, more heat was given out after the fire had gone out than while it was burning.

TABLE V.

Time: Evening of May 23, 1879.	Temperature of Air entering through Left-Hand Register.	Temperature of Air entering through Right-Hand Register.	Velocity of Current entering through Left-Hand Register, in Meters, per Minute.	Velocity of Current entering through Right-Hand Register, in Meters, per Minute.	Cubic Meters of Air entering through Left-Hand Register.	Cubic Meters of Air entering through Right-Hand Register.	Equivalent in Cubic Meters raised 1° (Left-Hand Register.)	Equivalent in Cubic Meters raised 1° (Right-Hand Register).	Remarks.
1	2	3	4	5	6	7	8	9	10
9.20	12°	12°	36	76	.54	.98	1.08	1.98	Fire lighted.
.25	17	13	63	76	.95	.98	6.65	2.97	
.30	22	14	76	57	1.15	.74	13.80	2.96	2d kilo. put on.
.35	28	17	90	57	1.35	.74	24.30	5.18	3d kilo. put on.
.40	34	20	69	57	1.04	.74	24.96	7 4	
.45	40	23	66	66	1.00	.86	30.00	11.2	4th kilo. put on.
.50	49	25	54	66	.81	.86	31.59	12.9	
.55	49	27	72	66	1.08	.86	33.54	14.6	5th kilo. put on.
10.	50	30	90	66	1.35	.86	54.00	17.2	
.05	55	30	90	66	1.35	.86	60.75	17.2	6th kilo. put on.
.10	57	30	90	66	1.35	.86	63.45	17.2	7th kilo. put on.
.15	59	30	36	54	.54	.70	26.46	14.0	
.20	60	30	54	54	.81	.70	40.50	14.	8th kilo. put on.
.25	61	31	66	54	1.00	.70	51.00	14.7	
.30	61	31	79	54	1.19	.70	60.70	14 7	
.35	60	30	97	54	1.46	.70	73.00	14.7	
.40	56	29	66	45	1.00	.58	46.00	11.0	
.45	52	27	66	54	1.00	.70	42.00	11.9	
.50	47	26	66	66	1.00	.86	37.00	10.2	
.55	45	24	66	48	1.00	.62	35.00	8.7	
11.	40	20	66	48	1.00	.62	30.00	6.2	
.05	39	19	66	54	1.00	.70	29.00	6.3	
.10	38	18	66	57	1.00	.74	28.00	5.9	
.15	36	18	63	54	.95	.70	24.70	5.6	
.20	35	17	57	54	.86	.70	21.50	4.9	
.25	33	17	54	54	.81	.70	18.63	4.9	
.30	32	17	51	54	.76	.70	16.72	4.9	
.35	30	16	48	54	.72	.70	15.84	4.2	
.40	29	16	45	54	.67	.70	18.40	4.2	
.45	28	16	39	54	.58	.7	10.44	4.2	
.50	27	16	31	54	.47	.7	8.00	4.2	
.55	26	16	31	54	.47	.7	7.52	4 2	
12.	25	16	31	54	.47	.7	7.05	4.2	
.05	24	16	31	54	.47	.7	6.58	4.2	
.10	23	15	31	54	.47	.7	6.11	3.5	
.15	22	15	31	54	.47	.7	5.64	3.5	
.20	21	15	31	54	.47	.7	5.17	3.5	
.25	20	15	31	54	.47	.7	4.70	3.5	
.30	19	14	31	54	.47	.7	4.23	2.8	
.35	18	14	31	54	.47	.7	3.76	2.8	
.40	17	14	31	54	.47	.7	3.29	2.8	
.45	16	14	31	54	.47	.7	2.82	2.8	
.50	15	14	31	54	.47	.7	2.35	2.8	
.55	14	13	31	54	.47	.7	1.88	2.1	
1.	13	13	31	54	.47	.7	1.41	2.1	
							1034.52	325.0	
							5	5	
							5172.6	1625.0	
								5172.6	
							Total,	6797.6	

TABLE VI.

Time: Evening of May 22, 1879.	Temperature of the Fresh Air entering Room through Register.	Velocity of Air in Meters per Minute.	Volume of Fresh Air in Cubic Meters per Minute.	Difference between external Air and Air entering Room through Register.	Equivalent in Cubic Meters raised 1°.	Remarks.
1	2	3	4	5	6	7
9.05	16°	18	.072	3°		Fire lighted.
.10	20	25	.10	7	2.12	
.15	30	30	.12	17	6.5	Second kilogram put on.
.20	64	38	.15	51	25.3	
.25	78	45	.18	65	51.4	Third kilogram put on.
.30	107	54	.22	94	82.1	
.35	116	54	.22	103	109.3	Fourth kilogram put on.
.40	128	54	.22	115	119.4	
.45	137	55	.22	124	134.2	Fifth kilogram put on.
.50	145	55	.22	132	142.0	
.55	148	55	.22	137	147.7	Sixth kilogram put on.
10.	156	55	.22	143	154.9	
.05	156	54	.22	143	157.2	Seventh kilogram put on.
.10	164	55	.22	151	163.0	Eighth kilogram put on.
.15	166	55	.22	153	166.0	
.20	168	55	.22	155	169.5	
.25	163	55	.22	150	169.5	
.30	158	57	.22	145	165.0	
.35	140	48	.19	127	159.5	
.40	108	36	.14	95	120.5	
.45	98	35	.14	85	66.5	
.50	93	35	.14	80	59.5	
.55	92	35	.14	79	56.0	
11.	85	30	.12	72	55.5	
.05	70	30	.12	57	43.0	
.10	60	30	.12	47	34.0	
.15	58	21	.12	45	28.0	
.20	50	21	.08	37	14.5	
.25	40	20	.08	27	10.5	
.30	35	20	.08	22	8.5	
.35	30	20	.08	17	6.5	
.40	25	20	.08	12	4.5	
.45	20	20	.08	7	3.0	
.50	18	20	.08	5	2.0	
.55	18	20	.08	5	2.0	
12.	18	20	.08	5	2.0	
.05	16	20	.08	3	1.0	
.10	16	20	.08	3	1.0	
.15	16	20	.08	3	1.0	
.20	16	20	.08	2	.5	
					2645.	

By Table VI. we have an equivalent of 2645 cubic meters raised 1° C. for the opening of forty square centimeters area, and $2645 \times \frac{150}{140} = 6877$ cubic meters raised 1° C. for the other opening, making a total of 9522 cubic meters. This is equivalent to 2971 heat units, making a saving of thirteen per cent, or one per cent more than was obtained by the previous experiment recorded in Table IV.

Fig. 116, redrawn from Johnson's Encyclopædia, represents a ventilating fire-place exhibited in the English Department of the Centennial Exhibition of 1876. It is very similar to the Dimmick Heater in principle, though widely different in the appearance of the exterior and in the manner in which the heated air is introduced into the apartment. These two fire-places are not provided with set blowers, as is the case with the Fire-Place Heater, and with the various forms of the Baltimore Heater, so called. In the Fire-Place Heater a fire may be kept over night by replenishing with fuel before retiring and leaving all blowers wide open and the base draught damper slides closed. If it be desired to put out the fire altogether, the lower sliding-blowers and the base draught damper should be shut and the upper blower slide left wide open. On the other hand the fire may be made to burn out slowly where the chimney draught is strong,

by shutting all blowers. There will be sufficient inflow of air through crevices to burn out all fire before morning. Thus the fire is quite under control, and may be regulated to suit any condition by properly adjusting the blowers and the sliding dampers in front of the base of the stove. When these blowers are closed the Fire-Place Heater is somewhat similar in exterior appearance to the Baltimore Heater, but more inviting-looking for private houses as having less the appearance of a furnace in the arrangement of the blowers. The Baltimore Heater is said to have been invented about thirty years ago by Latrobe, and was for some time called the "Latrobe Heater." It is now manufactured by different firms under various names, prominent among which are the "New Silver Palace" and the "Baltimorean," made by Bibb & Son, of Baltimore, Md.,

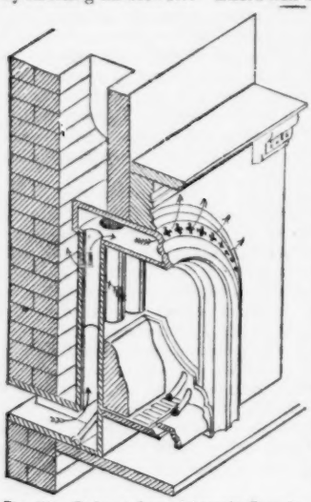
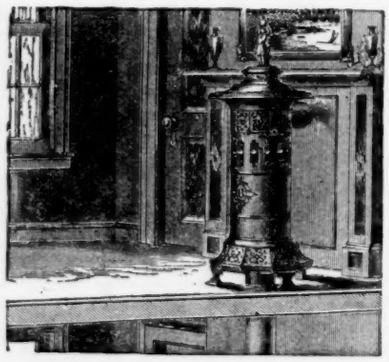


Fig. 116. Redrawn from Johnson's Encyclopædia.

the "Lawson's Fire-Place Furnace," manufactured by Fuller, Warren & Co., of Troy, N. Y., and the "Sunnyside Fire-Place Heater" of Stuart, Peterson & Co., Philadelphia. These heaters are really nothing more than small furnaces, set in an ordinary fire-place under a mantel. They have regular swinging furnace doors, provided with transparent mica panels arranged in tiers over each other like the windows of steamboat staterooms. They have, however, this great advantage over the ordinary furnace, that though they cannot be converted into an open fire-place at pleasure by simply sliding the blowers into side pockets, they nevertheless furnish direct radiation in that part of the house where it is needed and healthful rather than in the cellar where it is worse than useless. These heaters are provided with double flues to utilize the heat of the smoke in the manner already shown in Figs. 111, 112, and 115.

Figs. 117 and 118 show a Yankee method of treating the Galton flue in a "tasty" manner. The outer pipe takes the form of "an elegant stove," and is placed in the room in front of the fire-place which is built for ornament and "closed up nicely with a screen." With all its tastiness, what a cheerless and uninviting effect is produced, and how false the treatment both artistically and economically! In one sense the design is true; the heat is generated by a stove below and by a stove above it is represented. But in every other sense it is false. The envelope has the form of a heat-generator without performing its functions of consuming fuel or producing ventilation, and the fire-place is a sham of the worst kind. Practically this treatment is in every respect contrary to the correct principles of heating, and the ventilation of the room is by it reduced to a minimum, notwithstanding the deceiving presence of the fire-place, even when unscreened.



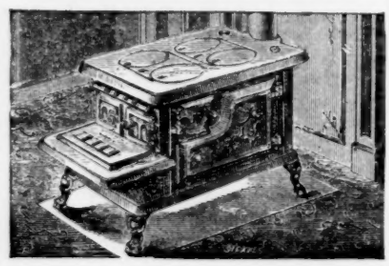
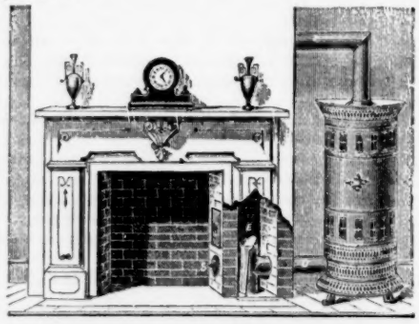


Fig. 117.

The radiator, instead of warming fresh air from the outside on its entrance, as it should, simply creates a feeble current in the neighborhood of the stove itself, without changing the air of the room, and what fresh air will find unwelcomed entrance must squeeze itself in through door and window cracks, contraband, and do what mischief it can in revenge for its cold reception before it is hustled out again through the fire-place opening. Hence no proper ventilating draught is produced by this fire-place, because no heat is generated there, and the imitation stove, having no fire of its own, is even more absolutely hostile to ventilation than the famous anti-ventilating German porcelain stove itself. It is worse than the ordinary stove, because it is necessarily hermetically sealed for the sake of the draught in the range below.



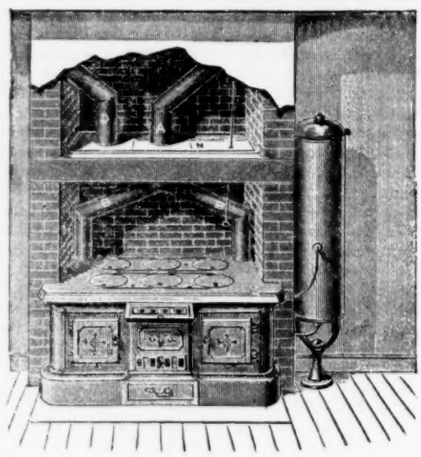


Fig. 118.

JACKSON'S VENTILATING FIRE-PLACE.

We come now to a form of ventilating fire-place which combines to a remarkable extent the desiderata heretofore set forth, and at the same time presents a most pleasing external appearance. In the front elevation (Fig. 121) we see apparently nothing more than the usual open fire-place with a frame decorated in a tasteful manner. The number and size of these openings regulate the size of the chimney throat which they form. The fresh air enters the room through the open-worked top of the frame at F. The section (Fig. 119) shows us the manner in which this fresh air is warmed. It enters the lower chamber B B through the register A, where it is partially warmed before it rises to the chamber surrounding the back and sides of the fire-place. Thence it enters the chamber D, where it plays around the short tubes forming the chimney throat, and passes thence through the perforated frame above described into the apartment. Fig. 122 shows the plan of the grate and the apparatus for shutting off the fresh-air supply. This latter consists simply of a disk of iron rotated by a lever so as to close wholly or in part the mouth

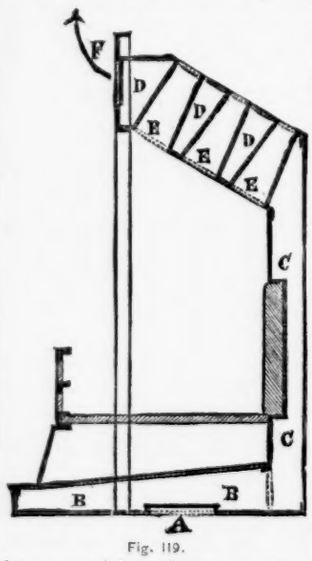


Fig. 119.

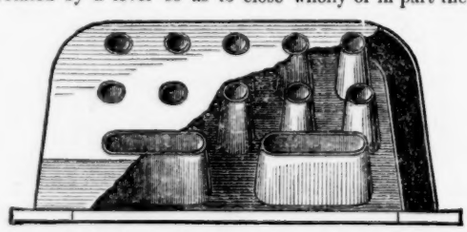
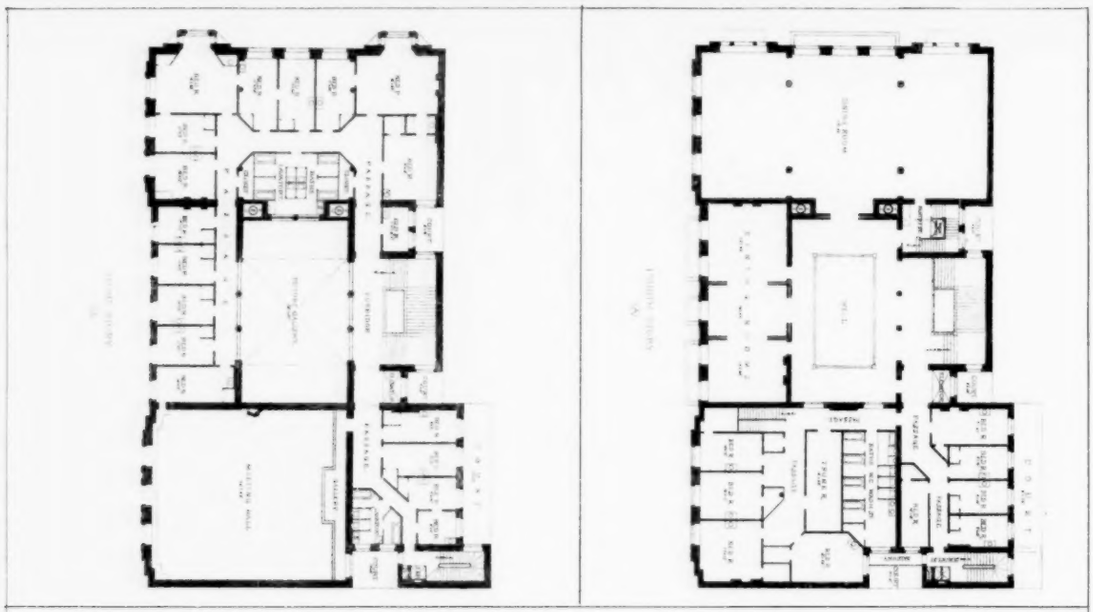
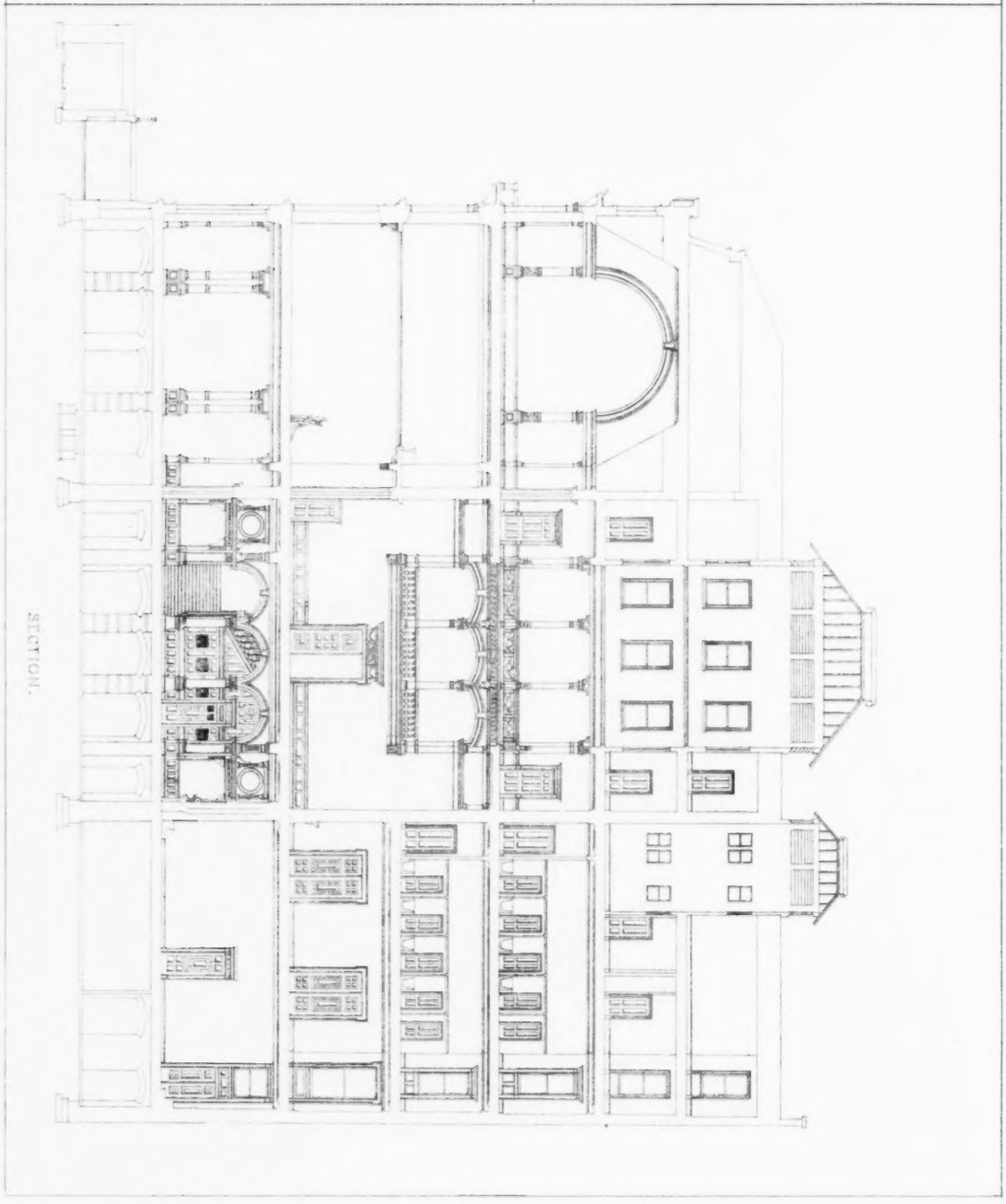


Fig. 120. Plan of Chamber D, directly over the Fire, with Top Plate broken away showing Flues.

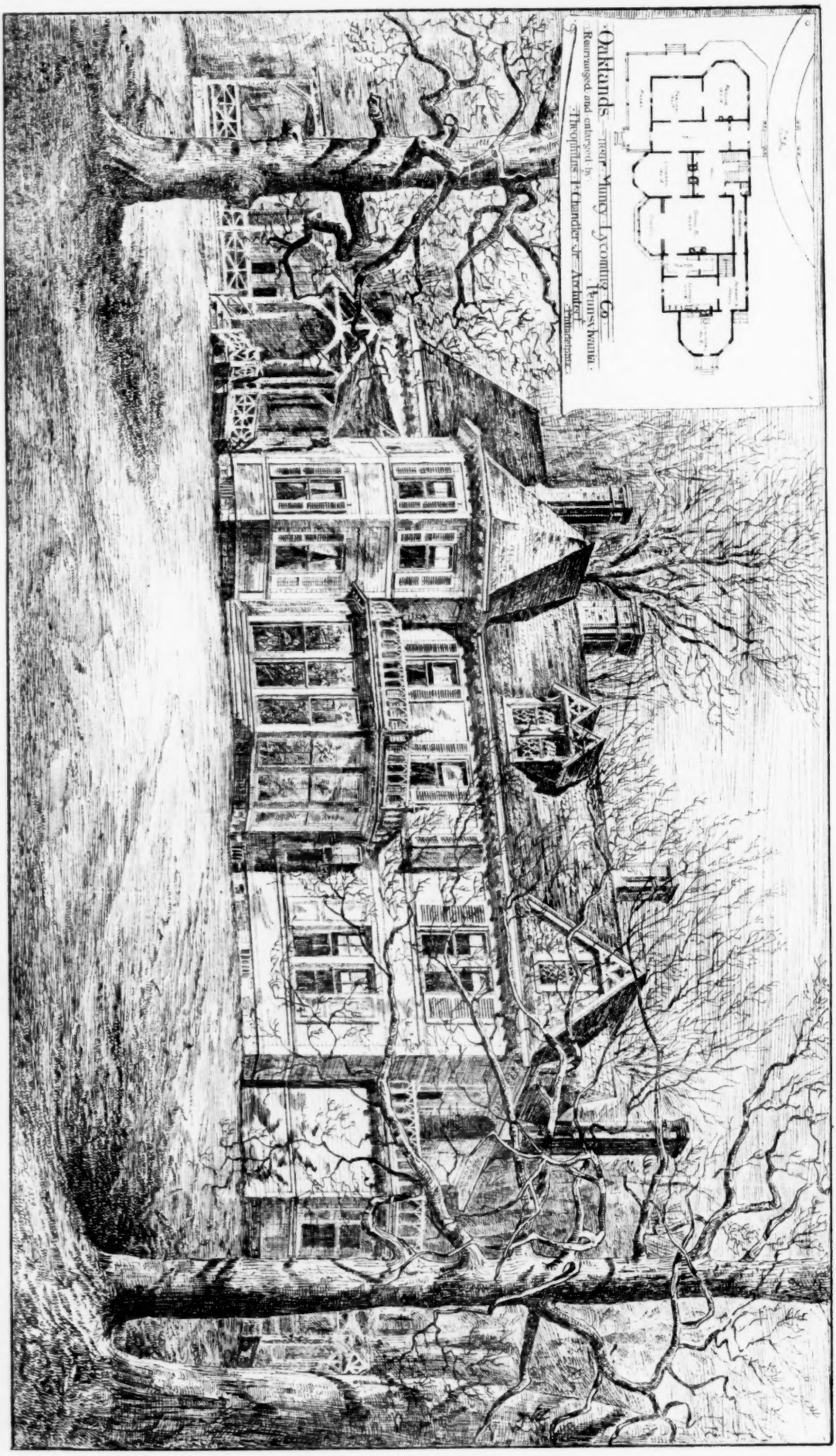




SECTION.

DESIGN FOR THE UNION LEAGUE CLUB HOUSE NEW YORK

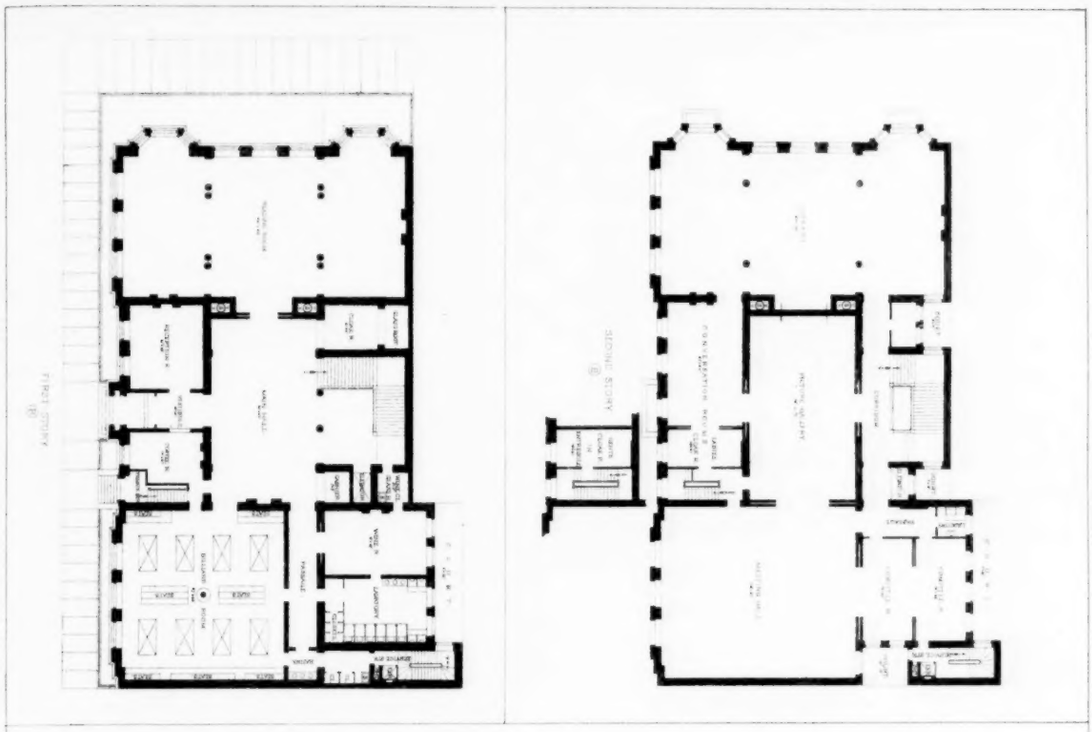
E. E. RAUT, ARCHT.

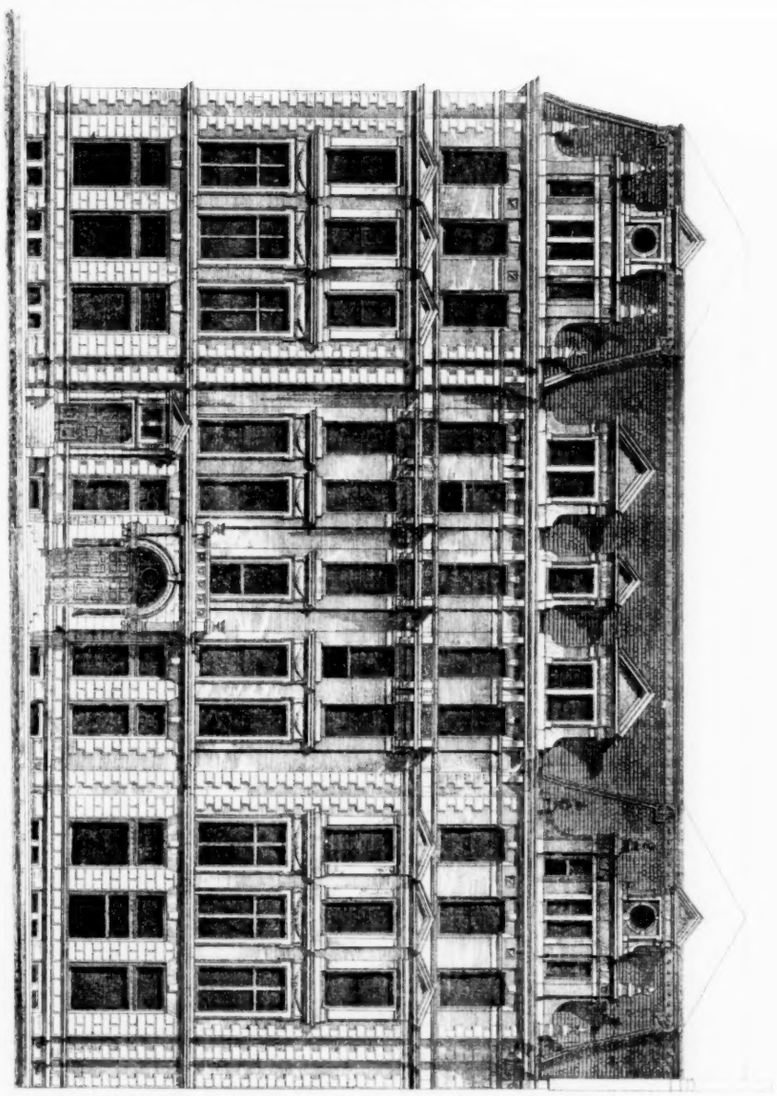

Oaklands
near Muncy Lycoming Co
Pennsylvania
Rearranged and enlarged by
Theophilus P. Chandler Jr. Architect
Philadelphia

THE HELIOTYPE PRINTING CO. 330 DEVONSHIRE ST. BOSTON.

THEATRE OF MONTE-CARLO M. Charles GARNIER. Architect

MONACO





DESIGN FOR THE UNION LEAGUE CLUB HOUSE NEW YORK.

E. E. RAFT, ARCHT.

THE HELIOTYPE PRINTING CO. 257 TO 263 CONGRESS ST. BOSTON.

of the fresh-air duct shown in section at A. Fig. 120 shows the

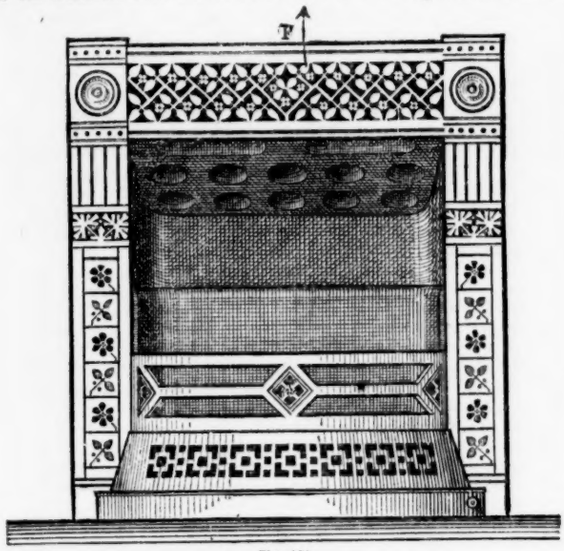


Fig. 121.

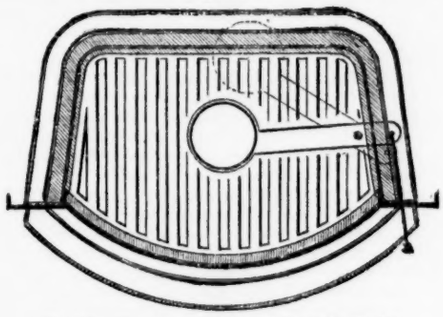


Fig. 122. Plan of Chamber B, directly under the Fire.

small smoke pipes in the chimney throat with the fresh-air chamber surrounding them.

THE ILLUSTRATIONS.

COMPETITIVE DESIGN FOR THE UNION LEAGUE CLUB-HOUSE, NEW YORK, N. Y. MR. E. E. RALET, ARCHITECT, NEW YORK.

THEATRE OF MONTE-CARLO, MONACO. M. CHARLES GARNIER, ARCHITECT.

IN *La Semaine des Constructeurs* for February 1, 1879, M. César Daly writes as follows of the theatre which we reproduce from a later number of the same journal: "The news of the hour is the opening at Monte-Carlo of the new theatre and concert-hall, which our confrère, M. Charles Garnier, has just built at the Établissement des Jeux. It is vigorous, masculine, rich, forceful, wonderful. The opera house at Paris was a prelude, a preliminary canter before the race, a mere preparation. The concert-hall at Monte-Carlo is the perfected fruit; it is the outcome, bewilderingly vigorous, of an idea long kept in abeyance, but which has at length escaped restraint; it is the feat of a bold nature whose strong vitality asserts itself in a hardy song; it is a rude bit, studied and executed in six months. The price matters not; it may have been two or three millions. There was needed for Monte-Carlo, a rendezvous of unquestionable luxury, intermittent elegance, and constant pleasure, where are collected worldlings and pleasure-seekers, a style of art at once rich, pampered, and luxurious, even if somewhat expansive; it was necessary to make the work splendid without being tiresome, full of warmth without being overpowering, full of light without being dazzling, and at the same time exciting and restful. As far as such a complex and even contradictory problem could be solved, M. Garnier has solved it.

"The hall is twenty metres square and nearly twenty metres high. The proscenium arch is nine metres wide and twelve high. The angles of the hall are cut off by walls almost four metres wide. From the floor to the top of the cornice is nearly twelve metres (11.80 m.), which leaves for the coving which connects the walls with the ceiling seven metres and a half, — a large proportion, when we consider the size of the hall, although the effect is excellent. In perspective it seems as if the developments of the two opposite coves and the horizontal portion of the ceiling were three nearly equal portions, one of which, the ceiling, is richly framed about, with garlands hanging vertically, here and there, and well detached from the ceiling. Attached to the four angle walls are elegant balconies, or projecting boxes, elliptical in form, and nearly four metres wide. Opposite the stage, in the axis of the hall, is the box of the prince of Monaco, which projects in a semicircle farther into the hall than the others, although it is not quite so wide. The angle walls play an important part in the composition. Under the elliptical boxes are broad niches, somewhat too low, which are well lighted and contain large vases of flowers. Above the boxes runs the cornice, which carries garland-holding figures, who are separated one from another by large cartouches; while above all, in the angles of the coves, where they serve to unite them, are large figures of Fame, with extended arms and long palm branches. Resting on the cornice over the four main walls of the hall are three bull's eyes, vigorously treated, which form a rich crowning member. The space on each cove between these bull's eyes, each pair of Fames, and the frame of the ceiling, forms the field for pictures which have been painted by M. Clairin, who has represented the Dance, M. Lix, who has painted Comedy, while M. Boulanger has represented Music, and M. Feyen-Perrin the Song.

"The sides of the hall are occupied by three arcades which are surmounted by the cornice and the bull's eyes. On the right, towards the sea, they are glazed, but on the left they are filled with enormous mirrors, while ample draperies hang on each side. In this way the sea, which can be seen through the windows on the right, is reflected by the mirrors on the left, so that the hall appears to be surrounded by the sea on all sides.

"The prevailing tone of the hall is tawny, with touches here and there of golden green, yellow, and red, so skilfully handled that the effect is mellow. Nowhere is the eye offended by the harsh reflection from metallic surfaces, yet it would be difficult to obtain a greater richness of effect. This effect of repose in the midst of so much luxury, this domination of the principal lines and masses over details in such vigorous relief, is a victory over a really great difficulty. In short, considering the public for whom it was built, its picturesque site, its aim, etc., I consider this work of Garnier's a very real success. In my opinion, looking at it from the point of view of maturity of talent, the theatre of Monte-Carlo is superior to the opera house at Paris, and in fact I do not know a theatre, the proportions and special circumstances being taken into account, which is as good as the theatre of Monte-Carlo."

OAKLANDS, NEAR MUNCY, PA., REARRANGED AND ENLARGED BY MR. T. P. CHANDLER, JR., ARCHITECT, PHILADELPHIA.

ON THE RELATION OF ARCHITECTURE TO UNDER-WRITING.[1] III.

IT now remains only to describe the causes of the rapid spreading of fires through buildings, and the precautions to be applied in preventing them.

The main cause is the want of a proper system of compartments, whereby a fire can be confined to the place where it originates until it is extinguished. This is the prevalent fault in the planning of all business buildings; and this is the very class in which such precautions are most needed. Those features of modern buildings which are most fruitful in disasters are open elevator-wells, light-holes, and stairways. The two former are most dangerous, because they are continuous vertical openings, while the latter may not be continuous, and may offer some obstruction to direct upward drafts.

It is often asked why the dangerous nature of elevators has become so much more evident lately than it was a few years ago. From some experience in connection with elevator protection, I will suggest this explanation. In stores and warehouses interior hoisting apparatus has been in use ever since the antiquated external cranes were abolished, perhaps for forty years, during which time most existing stores and warehouses in American cities have been erected. But until within about ten years past the hoistways consisted of square openings in the floors, through which a rope and hook were dropped from a windlass at the top, the windlass being worked by an endless rope passing over a wheel. These floor openings commonly had trap-doors of wood hinged on one side, so that they could be opened and closed with facility. The modern elevator, which has been supplanting these inconvenient hoists, consists of a movable platform counterbalanced with weights, and operated either by hand, steam, or water-power. The guides, safety appliances, counterbalances, and additional ropes, required by this improved machinery, occupy so much space in the well-holes that the use of trap-doors has become extremely inconvenient and in some cases impossible. Hence, where before the traps were closed at night, there are now none to close, except in a few instances. When elevators are put in, trap-doors disappear immediately. Hence we constantly hear of increasing "elevator fires."

The remedy for this state of affairs is not easy, still the question is capable of solution. What is demanded by the present exigency is that not only should some provision be made for closing these dangerous openings, but that human thoughtfulness should not be depended upon, and that the power so skilfully used to propel elevators should also be applied to operate traps or valves automatically.

[1] A paper read before the New York State Association of Supervising and Adjusting Insurance Agents, at Syracuse, May 20, 1879, by Mr. P. B. Wight, architect.

The number of inventions having the accomplishment of this in view is almost legion. In the neighborhood of fifty patents for automatic hatchway-closers have been filed in the Patent Office already. Until recently but few have been put into practical use, and most of them have proved to be failures. A few were introduced in Boston after the fire of 1872. None have ever been used in New York with success. A few, applied to small elevators, have been recently tried in Philadelphia. Of a number introduced in St. Louis four years ago, where the local board allows a rebate for them, but one is now working. In Chicago one kind was attempted seven years ago, and failed. It is only within the last eighteen months that the problem has been successfully solved in that city, and now it has more elevators provided with automatic closers than all the other cities together. Two kinds are there used, one the Meaker, the other the Van Osdel hatch-closer.

A large number of mill buildings in the New England States have been furnished with automatic closers, especially adapted to the simple styles of elevators there used, but not such as could be applied to the large steam and water elevators used in our modern warehouses. Besides the above, the Meaker automatic doors have been successfully applied to many brick-shaft elevators in Chicago and Milwaukee. Brick shafts for elevators should always pass through the roof, and be sufficiently open at the top to allow smoke and flames to escape.

Light-holes and light-shafts are fully as dangerous in conducting fires as elevators. In business buildings enclosed light-shafts with openings in the sides should never be allowed, unless constructed, like interior courts, with brick walls and open at the top. If light-holes and skylights cannot be dispensed with, all such openings should be arranged to be covered at night on every floor with movable shutters, or blinds, sufficiently fire-proof to resist the upward draft of a fire in its earlier stages. It is entirely practicable to provide these, and a mechanism may be used which will enable a person on the ground floor of any building to close all such openings, simultaneously, by turning a wheel. Skylights over such openings should always be of heavy glass, in metal frames, and covered with strong wire-work, to resist falling bodies. Stairways in stores and warehouses can only be made safe against the intrusion of fire by enclosing them with fire-proof partitions, and placing a door hung with spring butts and covered with sheet-iron or tin on the outside, at the foot of every flight. This is far preferable to letting down traps at night, because such traps would interfere with the free passage of firemen.

Care should be taken that no vertical air-boxes, chutes, enclosures for elevator ropes or weights, or other open constructions of wood, are introduced in any building. The covered channels used to contain steam, water, or sewer pipes are fruitful sources of danger to all buildings, and should be avoided by having such pipes exposed and closing the floors around them. Another danger to which all buildings containing machinery are exposed is found in the openings made in floors for belts or shafting. These should be reduced to the minimum. Systems of ventilation, also, which may be good in themselves, frequently conduce to the spreading of fires.

Unless due attention is given to closing all vertical openings, such as those here indicated, — and they by no means comprise all, — the construction of fire-proof ceilings and floors will be of little avail, and will not be worth the necessary expenditure.

But even if these precautions are observed, the absolute safety of the larger business structures can be preserved only by a proper system of subdivisions or compartments. The necessary size of such compartments will vary according to the use required of the building, but the smaller they are the better. The divisions may be made with either brick walls, or the various styles of fire-proof partitions that have been described. All openings in such partitions should be closed, either with iron doors on both sides, or a heavy sliding wooden door, covered with tin or sheet-iron on both sides. A recent invention provides for closing such sliding doors automatically. They run on inclined ways, so that the force of gravity will close them. The melting of a fusible link in a chain stretched across the top of the opening will release the doors and allow them to close by their own weight.

In conclusion, allow me again to call your attention to a sentence contained in the earlier part of these remarks. I expressed the hope that I might enable you, as insurers, to see more clearly what you have to contend with in assuming fire risks, and what, if you desire to diminish those risks, you may *reasonably demand*.

It is you, gentlemen, who hold in your hands a power to control the method of erecting modern buildings greater than all others combined, and which, if wisely directed, will speedily reform all the abuses you complain of. I know that in what I am about to refer to I touch upon the vital and all-absorbing point of dispute which has held possession of every convention of underwriters, national, state, or local, that has been held during the last three years. Nor do I pretend to take part in your discussions of it. The necessity for alluding to it on the present occasion only shows how it ramifies every subject in any way related to fire insurance. I need hardly add that it is the question of rates.

You may not only "reasonably demand" but *enforce* these reforms. The obstinate and tight-fisted citizen always stands ready to contest the building law, but will yield to the money argument, if you are firm in your demands. There are but few so foolish that they do not insure, and therefore few escape your overreaching grasp. You gather them all into your fold. They put their burdens upon your backs and you assume all their risks. The philosophic business man says that his property is his own until fire comes, and then it is yours. He takes no risk after he pays you his money. It is your interest and business alone that he shall not be burned. You must stand on guard over his property, and send out your patrolmen to see that no carelessness on his part results in the burning of it. The proprietorship, so far as all danger of fire is concerned, is transferred to you. If you rightly protect yourselves, you must put a money value on every item of negligence to provide against the incipiency or spreading of fire in his building. If you estimate these rightly, he will soon see the force of your arguments. Reforms will follow without further discussion, or the interference of the law.

Now, if you ask how this concerns the architects, I will quickly tell you. They have recently been the targets of much indiscriminate abuse; some of it merited, but most of it misdirected. It is only within the past few weeks that a discussion of many points in connection with the relation of architecture to underwriting has arisen between the president of the largest mutual manufacturers' insurance company and the *American Architect*, which is the honored organ of the architectural profession in this country, and I would respectfully ask you to peruse it in the columns of that paper. This profession is on trial and will not shirk its responsibilities. Though in individual instances it has been guilty of grave faults, it has this whole question deeply at heart. The improved construction of modern buildings with reference to limiting the dangers from fire is mainly due to the influence and invention of the architectural profession. The only exception that I know of is in the construction of mill buildings, and therein the mutual companies which make a specialty of that branch of insurance have not failed to do their duty to themselves and those whom they insure.

You stand between the architect, who wants to do what is right, and his client, who wants to do what is cheap. When you have demonstrated to the client that his parsimony is subject to an annual tax thereafter, he will quickly figure up both sides of the case, and find wherein his interest lies. If it is in the direction of a secure system of building, he will correct his errors as far as possible, and remember to avoid them the next time he builds.

When you throw your influence and power into an effort to reform prevalent abuses in the art of building, and thereby prevent these extensive conflagrations, you will always find the architects on your side; and I cannot help thinking that you might sometimes profit by taking them into your councils and availing yourselves of their experience. Interchange of ideas cannot fail to be of advantage to both professions. Hundreds of busy heads are constantly studying these problems, and vast additions are continually making to the store-house of human knowledge. The constant agitation of the fire question cannot but have a healthy result; and I trust that the time is not far distant when we may all lie down in our beds with the satisfactory assurance that our rest will be unbroken by the fire-fiend, and that we will rise again in the morning without dreading the fearful announcement that our earthly possessions have been swept away during the night.

CORRESPONDENCE.

BUILDING ACCIDENT.

Cincinnati, O.

The shocking accident at Post & Co.'s building on June 5, which entailed such a sad loss of life and property, is another evidence of the need and necessity of a thorough code of building laws in this city.

Here was a building five stories high, sixty feet on one street and forty feet on another; its floor joists resting on brick walls at one end and on wooden girders at the other, and these girders, in their turn, supported by wooden columns. It was used for the manufacture of railroad supplies; certainly as heavy a business as usually falls to the lot of the average building.

In the middle of the night this building took fire, and all the timbers were charred, more or less, from top to bottom; moreover, it was drenched with water, much weight being added thereby to the already over-burned and weakened supports. It was not yet cooled off when some thirty or more employes of the firm were sent in to clean out things "so as to go to work to-morrow," as one member of the firm is made to say in the public prints. Perhaps these thirty odd men working in the thoroughly soaked building were the last straw; be this as it may, the top floor gave way, and, in its turn, carries to destruction the floor below, and so on; the building becoming a total wreck.

The firm (who lease the building) claim that prior to sending their men into the building they, together with the insurance adjustor, called in Mr. J. W. Cotteral, a prominent and experienced builder of the city, to examine the building and see if things were safe, and that upon his report, the cleaning out was commenced. Mr. Cotteral, on the other hand, says that he was called in by the *owner* of the building to undertake the necessary repairs to put it in proper condition for occupancy; and that he was not questioned as regards the safety of the building, and consequently gave no opinion upon that matter. There is no question but that he examined the building, and having examined it, the question naturally arises, was it not his duty to in-

form the owners and others interested as to its insecurity? However, there seems to be a conflict of statements that only the official investigation can fully decide. All this leads us to reiterate that there appears to be no commission here whose duty it should be to inspect such and all other insecure buildings. To be sure, we have what is termed a "Board of Insecure Buildings," but their knowledge of the strength and purposes of building material hardly comes up to the law's allowance.

The loss in this disaster is six men killed outright and fifteen wounded, and the total destruction of the building and stock, which, as yet, is not stated in dollars and cents.

THE INTER-OCEANIC CANAL.

EACH route has its champion, who can prove satisfactorily to himself, at all events, that his particular plan is undoubtedly the best. Any one who has read the published accounts will remember that the chief obstacle is, in every case, either a proposed tunnel or a series of locks over the mountains. At this point the following questions seem to arise naturally: Why have these places been selected rather than any others, — such as Chiriqui, Sassardi, Carreto, or a dozen other locations? How have the surveys been conducted?

A good harbor or a navigable river, old Spanish or Indian traditions, have commonly determined the general route. The lines have usually been run up some river bed as far as possible, or on its banks, and when "headed" a straight across-country line cut through the woods to the nearest water-course on the other side of the ridge, — transit and level lines very likely, by entirely competent engineers. This method gives one point on the ridge. Doubtless fogs prevent at all times any special study of the topography from the sea, and, after landing, the jungle forbids any but straight lines, or simple meander of water-courses. At the same time, as the high land is reached the underbrush sensibly diminishes, and a comparatively small amount of cutting on the summits allows quite extended views. The coast lines on both sides of the isthmus seem to have been reasonably well located. Of certain portions (in connection with some of the canal schemes) there are quite thorough plane-table and hydrographic surveys, and as a whole may be considered as far enough advanced to be worthy of serious consideration and preliminary estimates.

The inland field work, on the contrary, can scarcely be classed, even by those who have had charge, as anything other than simple preliminary lines, the surrounding topography having been, as a rule, either entirely neglected or nearly so. It has been stated that each line run across the mountains gave one level on the summit. In round numbers there are four hundred miles of isthmus between Costa Rica and the Atrato-Napipi line, through which the Congress seem to have considered but two lines, Wyse's line near the Panama Railroad, and Kelley's line at San Blas. Two summit levels, and those fifty miles apart, are the only ones in a distance of four hundred miles. If from the summit, say on the Panama Railroad, transit and level lines be run parallel with the coast, on the top of the water-sheds, working toward both continents, the result would be a positive determination of the summit levels all along, instead of, as at present, perhaps one level for every hundred miles. That such lines are feasible below Panama there is no doubt, and probably but little as far north as Costa Rica.

Granted for a moment that such water-shed lines can be run out, would not a plan of the isthmus with a line of actual levels down its entire water-shed length, plotted in connection with existing coast surveys, make the only reliable basis to work upon? Blanchet's Nicaragua route is the least costly of those before the Congress, and this with an estimate of $82,200,000. One hundredth part of that sum ought to show conclusively whether a cheaper route could be found anywhere on the lower six hundred miles of the isthmus.

Without further actual field work, American engineers will be slow to believe that the best location has yet been found. — *Ernest W. Bowditch in the Boston Daily Advertiser.*

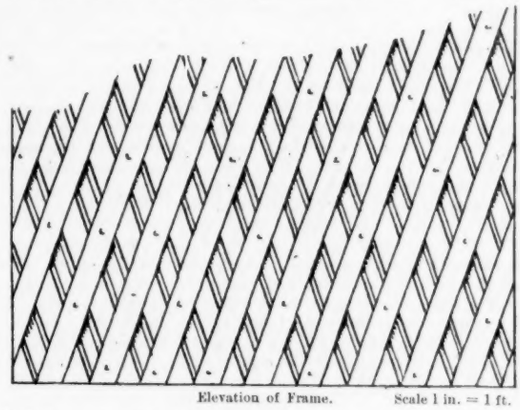
FIRE-PROOF PARTITIONS.

WASHINGTON, D. C., June 2, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

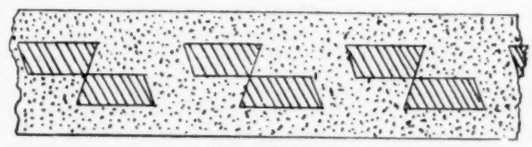
Dear Sir, — You publish from time to time notes on fire-proof construction. I have in my practice for some years used a cheap and effective fire-proof partition, instead of the ordinary stud, lath and plaster partition, which in construction has many flues through which drafts carry fire rapidly all over a house. It costs little if any more than the common inflammable partition, and is practically fire-proof.

The skeleton of this partition is made of strips of sawed lumber about from ¾ by 1½ to 1¼ by 2 inches. They are set up as a lattice partition, leaving long lozenge openings like the meshes of a net, which should not generally be more than 2 inches wide. The common plaster mortar is spread on one side, and when this is set the other side is plastered. The key is good, for the two coats of mortar unite. The wood, which is a narrow strip, is perfectly imbedded in the mortar so that it cannot be burned, even by exposure for a considerable time to a hot fire. There are no flues to carry fire to the top of the building into the roofs and floors. While the two diagonal sets of wooden strips should be firmly nailed, fewer nails are consumed than in securing laths on the upright studs in common use. It is well to place the strips at an angle with the vertical, of about 20°, *i. e.*, between 45° and the vertical. It is also well, though not absolutely necessary, to cut the strips of trapezoidal form, and to place them



Elevation of Frame. Scale 1 in. = 1 ft.

with their mortar sides to the outside of the partition. Thus each strip acts as a key to hold the plaster.



Horizontal Section. Scale 3 in. = 1 ft.

These partitions are very stiff when finished in hard finish. For upper rooms ⅞-inch lumber is sufficient; for lower rooms, which carry the weight of floors above, 1¼-inch is stiff enough. A partition of ⅞-inch stuff will be about three inches thick, or of five-quarter stuff 3½ inches thick, which effects an economy of space in a house, enlarging the rooms without weakening the partitions, which are usually not less than six inches thick.

Very respectfully your obedient servant,
M. C. MEIGS, Quartermaster-General,
Bvt. Major-General, U. S. A.

[The partition here described will commend itself at once for its fire-resisting quality, and ought to be as much a barrier to sound as the ordinary partition. Of its lateral stiffness, as to which we should have had some misgiving, General Meigs's testimony is decisive; and it must have considerable vertical strength, so as to sustain itself unsupported, without further trussing, unless pierced or heavily loaded. We should have fears, nevertheless, for its serviceableness in permanent constructions, on account of the danger of dry-rot, which would make it treacherous, and might destroy its strength in a few years. — EDS. AM. ARCHITECT.]

THE GRAND CENTRAL DEPOT ROOF AGAIN.

NEW YORK, June 7, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — It is with considerable reluctance that I again refer to the question of the part the late Mr. R. G. Hatfield took in designing the roof of the Grand Central Depot in this city. It is a subject which can be of very limited interest to you, sir, or to your numerous readers. But your correspondent, "H.," having claimed that my brother had nothing whatever to do with designing the roof in question, I propose, with your permission, to put on record a phrase or two from the numerous memoranda on the subject in my possession, which, I think, fully justify me in the statements made in my communication of April 28.

On the 11th day of January, 1870, he was consulted by Mr. Nathaniel Cheney, the Vice-President of the Architectural Iron Works of this city, as to the best form of arch to be recommended for adoption in the construction of the trusses for the proposed roof of the new depot. On the day following he met Mr. Buckhout and Mr. Duclos, at the station then in use at Twenty-sixth Street and Fourth Avenue in this city in consultation upon the subject. He was there shown two sketches of trusses for the roof, made some preliminary rough calculations of the resultant strains, and gave it as his opinion that of the different forms proposed a full arch was by far the best. Mr. Hildeberger, an engineer, had suggested a crescent-shaped, arched truss, of great depth at the crown, but very narrow at the lower ends, and resting upon columns at a considerable height above the ground. This he disapproved of as subjecting the material to unnecessary strains; and expressed himself as greatly preferring a full and nearly semicircular arch. The other sketch was by Mr. Duclos, and approached more nearly the form of a semicircle.

On the 13th, Mr. Duclos and Mr. Hildeberger called at his office, and he then explained to them why he considered a full arch better than a segment. On the same day he visited the Harlem R. R. Depot, and saw Mr. Buckhout, the engineer of the road, and

consulted farther with him about the roof. He then commenced a study of the strains involved, and continued it for several days. Finally, the form recommended by him having been adopted, he called on the 18th upon the proprietors of the iron works, and claimed that as he had become as it were responsible for the stability of that form of arch, he ought to be employed by them "to design it." "They engaged me to do so," he wrote the same day; and he immediately proceeded to make the necessary investigation as to what modification of the full semicircle, if any, would be required. On the 20th he reported that the sectional area of iron in the rib would require an average of thirty-five inches, and that the horizontal thrust at the bottom of the truss would not exceed 75,000 pounds.

On the 25th he wrote to Mr. Cheney, calling attention to the necessity of having the truss conform to the arc of equilibrium due to the weights to be carried, which indicated a form departing somewhat from that of the semicircle. The various diagrams which he had made at the time to determine these strains are now in my possession, and are signed by the initials of his draughtsman, and also contain the date. He continued to be consulted from day to day, in regard to the construction of the roof, up to the month of June of that year, and frequently visited the depot to inspect the work.

I submit, therefore, whether this record looks like that of a man who "had nothing whatever to do with designing the depot roof."

Very respectfully yours,

O. P. Hatfield.

PUBLICATIONS RECEIVED.

The Hypæthral Question. An Attempt to Determine the Mode in which the Interior of a Greek Temple was Lighted. By Joseph Thacher Clarke, Architect. Papers of the Harvard Art Club, No. 1. Harvard College, Cambridge. 1879.

Notes on Building Construction: Arranged to meet the Requirements of the Syllabus of the Science and Art Department of the Committee of Council on Education, South Kensington. Part III. Materials. Advanced Course, and Course for Honors. London, Oxford, and Cambridge: Rivingtons. 1879.

Cameron's Plasterer's Manual. Containing Accurate Descriptions of all Tools and Materials used in Plastering; Description of the Appearance and Action of Every Variety of Lime and Cement; Instructions for Making all Kinds of Mortar; Instructions for Doing all Kinds of Plain and Ornamental Plastering; Cistern Building; Form of Contract; Useful Tables; Many Important Receipes, etc. With Illustrations. By K. Cameron. New York: Bicknell & Comstock. 1879.

Ames's Alphabets. Adapted to the use of Architects, Engravers, Engineers, Artists, Sign-Painters, Draughtsmen, etc. By Daniel T. Ames. New York: Bicknell & Comstock. 1879.

NOTES OF EXPERIENCE AND INEXPERIENCE.

24. Weather Strip. — "T. M. C." can obtain weather strips of Foster S. Sheverick, Falmouth, Mass. Probably he can inform him where he can get them nearer Boston. O. F. Smith.

25. The American Institute of Architects. — Will your valuable journal, or some of its readers, inform me how I can obtain rules and regulations as adopted by the "American Institute of Architects" of New York city? And oblige a new practitioner, J. E. D.

[The Secretary of the American Institute of Architects, Mr. H. M. Congdon, 111 Broadway, New York, N. Y., will gladly furnish the desired information. The rules regulating the professional practice, and charges adopted by the Institute, were published in the *American Architect* for June 2, 1879. The American Institute of Architects, by the way, is a national association, and is represented in New York and other large cities by chapters. — Eds.]

26. White Incrustation on Brickwork. — Would you have the kindness to inform me of the best means to prevent the outeropping of saltpetre on fine brickwork. This spring we had sudden warm weather after frost, and as an apparent consequence *every building*, else not covered, was then full of saltpetre; the black joints in particular were white, and now the spots are dirty. If this cannot be prevented, then there will soon be an end of good brick buildings. J. Baumann.

NOTES AND CLIPPINGS.

A Fire-Extinguishing Liquid. — Some years ago at the burning of a tar distillery Mr. Watson Smith discovered that crude ammonia water, or gas-liquor as it is called, thrown upon the fire, which was raging violently, quenched it almost instantly.

A Large Block of Stone. — One of the largest blocks of granite ever cut in the United States has recently been taken from the quarry at Vinalhaven. It is fifty-nine feet long, five feet and a half square at the base, and three feet and a half square at the top. It weighs from seventy five to one hundred tons. It cost $1,700 to quarry it and move it to the shed where it is to be finished. It is to form the shaft of the monument to General Wool, to be erected at Troy, N. Y. The shaft with the base stones will form a structure about seventy-five feet high.

A Belgian Pantheon. — The *Anglo Belgian Correspondence* states that it is proposed to celebrate the fiftieth year of Belgian independence by building on one of the heights in the neighborhood of Brussels "a huge Pantheon after the style of Westminster Abbey, to contain the portraits and statues of the great men — statesmen, generals, artists, writers, and philanthropists — of Belgium."

Yellow-Fever and New Orleans. — We do not know whether the auxiliary Sanitary Association of New Orleans is a private or a public body, nor do we know to what it is auxiliary; but it seems to be bestirring itself very actively and successfully in doing what is possible to keep yellow-fever in check during the coming season, though it is not to be expected that it can be kept out of the city altogether. The prospect seems to be very encouraging, for the finance committee of the association reports its expenses at $4,000 and its receipts at $28,900 This income is the result of private contributions and in a great measure is derived from various excursions on land and river, which have been organized by the association, and receive the ready support of the pleasure-loving citizens. Among the most important precautions undertaken is the systematic daily flushing of the street gutters with river water, which is easily accomplished by stationary engines, and by a number of tug-boats which have been chartered for the purpose. This action of the association seems to have suggested a new idea to the inhabitants, for they are reported to turn out daily to clean their house-yards and banquettes, so that it may yet become the duty of the New Orleans house-servant to clean and wash his sidewalk and gutter every day, as it is the duty of such servants in Baltimore. The purchase of street-sweeping machines and garbage boats, the distribution of disinfectants, and the ferreting out and abating of all sorts of nuisances, are amongst the good things undertaken by this association.

Statues for Lichfield Cathedral. — The action of the municipality of Paris in seeking to provide statues for the niches on the façades of the Hôtel de Ville, which we mentioned a short time ago, finds its antithesis in the course which the Dean and Chapter of Lichfield Cathedral propose to take in order that they may fill the niches in the newly restored west front of their cathedral. There are one hundred and eight of these niches, and as it is impossible to supply the statues out of the diocesan funds it is proposed that each statue shall be given by some person, as it is easy to see that in this way the work is more likely to be accomplished than if a general subscription were to be opened. Thus any person who may be willing to give $225, which is to be the cost of each statue, can ensure the perpetual association of his name with the cathedral. The Dean and Chapter have decided wisely to keep the control of the scheme in their own hands, and have prepared a list of saints, kings, prophets, and other Biblical personages from whom each person may select the one whom he prefers to honor; but, and in this lies the contrast with the French scheme, the Dean reserves the right of selecting the sculptor and regulating the style, so that all may have a certain uniformity and be in consonance with the building.

The Electric Light at Billingsgate Market. — The experiment of using the Jablochkoff candle in the great London fish-market has proved a failure, not because it was too expensive or because it did not give enough light, but because the people who dealt there having become accustomed to examine their purchases by gas-light — for most of the trading is done between three and four o'clock in the morning — could not understand that it was the effect of the electric light only which made the fish, just caught, look as if it had been lying in the stalls for days instead of hours, and so insisted that they would give only half the usual prices for all they bought. The fish-mongers, finding that their profits were dwindling beyond enduring, threatened a rebellion and forced the electric light to be banished from their peaceful midst.

Protecting Lead Pipes. — The *Revue Industrielle* says that the interior of a lead pipe can be covered with an incrustation of sulphide of lead by making a warm concentrated solution of sulphide of potash flow through it for ten or fifteen minutes. Pipes thus treated seem to be covered with grayish varnish, which prevents the water flowing through them from acting upon the lead.

Lightning-Rods again. — Mr. R. S. Brough has been discussing in the *Philosophical Magazine* the proper sectional areas of iron and copper lightning-rods. So far as mere conductivity is concerned, a comparatively thin wire of either metal would suffice for the loftiest conductor; but such a thin conductor would be dangerous, because it would be fused by a heavy discharge of lightning. Iron is more liable to be fused than copper; and the point Mr. Brough sought to determine was the relative sectional areas of rods of the two metals so that neither would be more liable to fuse than the other. Ordinarily it is stated that the iron rod should have four times the sectional area of the copper rod. Mr. Brough shows that these areas should be as 8 to 3; or, since the rods are circular, and circular areas are to each other as the square of their diameters, the diameters of iron and copper rods of equal effectiveness should be in the proportion of 1.63 to 1. Iron is therefore much the cheaper metal for lightning rods.

Another Proof of the Exactitude of Pausanias. — When the excavations at Olympia were first undertaken, the German Postmaster-General, Dr. Stephan, drew attention to a passage in Pausanias which mentioned a statue that had been erected in honor of a courier of Alexander the Great, and begged that special search might be made for it. News has reached Berlin lately from Olympia that the base of this statue had been found, with a well-preserved inscription which runs thus: "By the King Alexander's Runner and Traverser of Asia, Philonides, son of Totos, from Kretan Chersonesos, this was dedicated for the Olympian God."

Glue. — Carpenters should remember that fresh glue dries much more readily than that which has been once or twice melted. Dry glue steeped in cold water absorbs different quantities of water according to the quality of the glue, while the proportion of the water so absorbed may be used as a test of the quality of the glue. From careful experiments with dry glue immersed for twenty-four hours in water at sixty degrees Fahrenheit, and thereby transformed into a jelly, it was found that the finest ordinary glue, or that made from white bones, absorbs twelve times its weight of water in twenty-four hours; from dark bones, the glue absorbs nine times its weight of water; while the ordinary glue, made from animal refuse, absorbs but three to five times its weight of water. — *Building News.*